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[54] **METHOD AND SYSTEM FOR LOCATING A MOBILE STATION**

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[52] **U.S. Cl.** **455/456**; 455/67.6; 455/422

[58] **Field of Search** 455/422, 426, 455/456, 457, 502, 503, 458, 67.6, 515, 525, 562; 342/357, 457

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,293,645	3/1994	Sood .	
5,943,014	8/1999	Gilhousen	455/456

FOREIGN PATENT DOCUMENTS

19533472	3/1997	Germany .
3235077	10/1991	Japan .
2280 327	1/1995	United Kingdom .
WO 9500821	1/1995	WIPO .
WO 9642020	12/1996	WIPO .

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[57] **ABSTRACT**

This invention relates to a mobile station locating method for locating a mobile station based on a mobile communications system. Radio zones of base stations are dissected into a plurality of search areas (grid sections). A positional relationship between base stations and a concerned search area is defined by mutual time differences in the radio wave propagation between them. The base stations transmit their characteristic signals. Time differences in the propagation of the characteristic signals are caused between transmission of the characteristic signals at respective base stations and reception at a mobile station. Mutual differences in their propagation times are used to identify a search area where the mobile station is present. Thus, the position of the mobile station can be identified by an area not by a point.

13 Claims, 5 Drawing Sheets